

Materials

- Fraction number cubes in two colors (3 per pair)
- Pattern blocks
- Student Sheet 5 (2–3 per student)
- Colored pencils, markers, or crayons
- Student Sheet 9 (1 per student)
- Fraction Cards (students' sets from Investigation 1)
- Overhead projector

The Fraction Cookie Game

What Happens

Students play a pattern block and fraction number cube game that involves adding and subtracting fractions. They also learn a game with their Fraction Cards. Their work focuses on:

- identifying fraction parts
- exchanging equivalent fractions
- adding and subtracting fractions

Activity

Game Warm-Up

Introduce the Fraction Cookie game to the whole class. Explain that in this game, students are to collect pieces of pattern-block cookies. The basic game works with one fraction number cube. Players will take turns rolling the number cube and then add to their cookies the exact amount of their roll. Demonstrate briefly by rolling one fraction number cube and putting the pattern block representing that fraction on the overhead. Roll again, and add the new block or blocks to your display.

Trading Up Another basic part of the game is “trading up.” Players must trade two or three pieces for a larger piece whenever possible, so that at the end of each turn their total number of collected cookies is represented with the fewest possible pattern blocks. For example, a player with $2\frac{1}{2}$ cookies should have two yellow cookies and one red half at the end of the turn. Players should be alert to ways they could combine greens, or a green and a blue, to make larger pieces. Explain and demonstrate this on the overhead.

Each player starts with a blank copy of the Hexagon Cookies sheet (Student Sheet 5) on which to place the collected pieces. If yellow hexagon blocks are in short supply, students may use the sheet for recording their completed cookies; each time a cookie is complete, the player can remove the blocks from the sheet and color in the cookie. See the **Dialogue Box**, *Playing the Fraction Cookie Game* (p. 37), for a portion of a game between two students.

Activity

Playing the Fraction Cookie Game

Students play in pairs. When they seem to tire of the beginning version (for some, this may happen quite quickly), introduce the two more challenging versions explained below. Some students will play the simpler versions longer than others; there is no need to rush them to a higher level.

Beginning Game (One Number Cube) Players roll one number cube and add the amount on the cube to their cookie collections. For example, if the cube shows $\frac{1}{3}$, the player takes a blue diamond ($\frac{1}{3}$ of a yellow cookie). Each player completes a turn without interruption; the other player then checks the first player's work. Encourage overly helpful students to give quieter students a chance to decide for themselves how they want to play out their turns and make their trades. Let students decide how many cookies a player needs to win the game.

Intermediate Game: Adding Fractions (Two Number Cubes) As pairs of students seem ready, hand out another number cube so that they can throw two cubes and add the fractions to determine how much cookie to take. As in the beginning game, players finish their turn by making the trades necessary to get the fewest pieces in their cookie collection. Partners check each other's work after each turn.

Advanced Game: Adding and Subtracting (Three Number Cubes) When students are comfortable playing with two number cubes, introduce a third cube of a different color. On each turn, players roll two cubes of one color and a third cube of a different color. They add the amounts on the first two cubes and subtract the amount on the third cube from their cookie collections.

In this version of the game, players start with two hexagon cookies (so they won't run out when they subtract). The first player to get four cookies (or students can decide on another number) wins. Some students will be ready to try this variation before others.

Activity

The Fraction Card Game

Toward the end of the session, hand out copies of Student Sheet 9, How to Play the Fraction Card Game. To play the game in class, pair up students who have Fraction Card sets in different colors, or have them mark their sets with initials or a colored marker so they can tell the two sets apart. This game requires some space, so try to play on the floor or a clear table.

The two players each mix up their own Fraction Cards and stack them, number side down, in front of them. At the same time, the two players turn over one card from the top of their set, so that the fraction label shows. The player who puts down the larger Fraction Card takes both cards. If the cards are the same size, each player turns over another card, and the player with the largest card takes all four. (To this point, the game is much like the card game War, which students may already know.)

As players win cards, they must try to make a “whole” with them, putting the fractional parts together. (This is what takes up space!) Any cards that the player has already won may be used at any time to form a whole.

Play continues until all the cards have been turned up and won by either player. The person with the most wholes at the end is the winner.

Allow class time for one or two sample rounds.

Session 4 Follow-Up



Homework

How to Play the Fraction Card Game Students take home their class set of Fraction Cards and Student Sheet 9, How to Play the Fraction Card Game. They should already have another set of Fraction Cards at home (made as homework during Investigation 1), so they can play the game with friends and family members. As necessary, send home extra copies of How to Make Fraction Cards (p. 73).